

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 3

Amendments to the Claims

Please amend the claims as follows:

1. (Currently Amended) A process for making a heat treated ground ceramic cutting insert comprising the steps of:

providing an uncoated ground ceramic cutting insert having at least a portion thereof being ground; and

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert, and wherein the heat treatment occurs in a nitrogen atmosphere at a pressure of one atmosphere and at a temperature of between about 1815 degrees Centigrade and 1860 degrees Centigrade for a duration of between about 130 minutes and about 270 minutes.

2. (Currently Amended) The process according to claim 1 wherein:

the heat treatment occurs in an atmosphere comprising one or more of nitrogen and argon and carbon monoxide; the heat treatment occurs at a pressure ranging from sub-atmospheric to about 30,000 psi;

the heat treatment occurs at a temperature ranging between about 1300 degrees Centigrade and about 2200 degrees Centigrade; and

the heat treatment occurs for a time between about fifteen minutes and about six hours.

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 4

3. (Cancelled)

4. (Currently Amended) ~~The process according to claim 1~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

providing an uncoated ground ceramic cutting insert having at least a portion thereof being ground; and
heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert, and wherein the heat treatment occurs in an argon atmosphere at a pressure of about one atmosphere and at a temperature of about 1650 degrees Centigrade for a duration of about 60 minutes.

5. (Original) The process according to claim 1 further including the step of coating the heat treated ground ceramic cutting insert.

6. (Original) The process according to claim 5 wherein the coating is selected from one or more compounds of the group consisting of alumina, titanium nitride, titanium carbonitride, titanium carbide and titanium aluminum nitride.

7. (Original) The process according to claim 1 further including the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 5

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact;

hot isostatically pressing the sintered unground ceramic cutting insert compact so as to form an uncoated unground ceramic cutting insert blank; and

grinding at least a portion of the uncoated unground ceramic cutting insert blank so as to form the uncoated ground ceramic cutting insert.

8. (Original) The process according to claim 7 wherein after the hot isostatically pressing step, the uncoated unground ceramic cutting insert is subjected to an additional sintering step.

9. (Original) The process according to claim 1 further including the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact; and

grinding at least a portion of the sintered unground ceramic cutting insert compact so as to form the uncoated ground ceramic cutting insert.

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 6

10. (Currently amended) ~~The process according to claim 9~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact;

grinding at least a portion of the sintered unground ceramic cutting insert compact so as to form an uncoated ground ceramic cutting insert having at least a portion being ground;

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert, and

wherein the powder mixture comprises between about 60 weight percent and about 98 weight percent silicon nitride, up to about 25 weight percent aluminum nitride, up to about 25 weight percent alumina, up to about 2 weight percent magnesia, and up to about 7 weight percent yttria.

11. (Currently Amended) ~~The process according to claim 7~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 7

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact;

hot isostatically pressing the sintered unground ceramic cutting insert compact so as to form an uncoated unground ceramic cutting insert blank;

grinding at least a portion of the uncoated unground ceramic cutting insert blank so as to form the uncoated ground ceramic cutting insert having at least a portion being ground;

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert; and

wherein the powder mixture comprises about 98 weight percent silicon nitride, about 1 weight percent magnesia and about 1 weight percent yttria.

12. (Currently Amended) ~~The process according to claim 9~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact;

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 8

grinding at least a portion of the sintered unground ceramic cutting insert compact so as to form an uncoated ground ceramic cutting insert having at least a portion being ground;

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert, and

wherein the powder mixture comprises about 85.4 weight percent silicon nitride, about 6.2 weight percent aluminum nitride, about 3.7 weight percent alumina, and about 4.7 weight percent yttria.

13. (Currently Amended) ~~The process according to claim 9~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact;

grinding at least a portion of the sintered unground ceramic cutting insert compact so as to form an uncoated ground ceramic cutting insert;

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert, and wherein the powder mixture

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 9

comprises about 63.3 weight percent silicon nitride, about 9.3 weight percent aluminum nitride, about 22.7 weight percent alumina, and about 4.7 weight percent yttria.

14. (Currently Amended) ~~The process according to claim 7~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact;

hot isostatically pressing the sintered unground ceramic cutting insert compact so as to form an uncoated unground ceramic cutting insert blank;

grinding at least a portion of the uncoated unground ceramic cutting insert blank so as to form an uncoated ground ceramic cutting insert having at least a portion being ground;

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert; and

wherein the powder mixture comprises about 91.6 weight percent silicon nitride, about 1.6 weight percent aluminum nitride, about 1.3 weight percent alumina, and about 5.5 weight percent yttria.

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 10

15. (Currently Amended) ~~The process according to~~
~~claim 7~~ A process for making a heat treated ground ceramic
cutting insert comprising the steps of:

forming a green ceramic cutting insert
compact from a powder mixture;

sintering the green ceramic cutting insert
compact so as to form a sintered unground ceramic cutting
insert compact;

hot isostatically pressing the sintered
unground ceramic cutting insert compact so as to form an
uncoated unground ceramic cutting insert blank;

grinding at least a portion of the uncoated
unground ceramic cutting insert blank so as to form an
uncoated ground ceramic cutting insert having at least a
portion being ground;

heat treating the uncoated ground ceramic
cutting insert so as to form the heat treated ground
ceramic cutting insert; and

wherein the powder mixture is silicon
nitride-based, and prior to the sintering step, the green
ceramic cutting insert compact is in contact with a setting
powder; and the setting powder includes one or more of the
following and/or their reaction products: the oxides of
aluminum, hafnium, zirconium, yttrium, magnesium, calcium
and the metals of the lanthanide series of the elements;

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 11

and nitrides and/or carbides of silicon, titanium, hafnium, aluminum, zirconium, boron, niobium and carbon.

16. (Currently Amended) ~~The process according to claim 7~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact;

hot isostatically pressing the sintered unground ceramic cutting insert compact so as to form an uncoated unground ceramic cutting insert blank;

grinding at least a portion of the uncoated unground ceramic cutting insert blank so as to form an uncoated ground ceramic cutting insert having at least a portion being ground;

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert; and

wherein the powder mixture ~~further~~ including up to thirty volume percent of at least one component selected from the group of hafnia, zirconia, and the nitrides, carbides and/or carbonitrides of titanium, silicon, hafnium, and zirconium and their mixtures.

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 12

17. (Original) The process according to claim 1 further including the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

uniaxially hot pressing the green ceramic cutting insert compact so as to form a hot pressed unground ceramic cutting insert compact; and

grinding at least a portion of the hot pressed unground ceramic cutting insert compact so as to form the uncoated ground ceramic cutting insert.

18. (Original) The process according to claim 17 wherein the powder mixture comprises alumina and silicon carbide whiskers.

19. (Original) The process according to claim 18 wherein the powder mixture further includes zirconia.

20. (Original) The process according to claim 18 wherein the powder mixture further includes titanium carbonitride.

21. (Currently Amended) ~~The process according to claim 20 forming a green ceramic cutting insert compact from a powder mixture~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 13

uniaxially hot pressing the green ceramic cutting insert compact so as to form a hot pressed unground ceramic cutting insert compact;

grinding at least a portion of the hot pressed unground ceramic cutting insert compact so as to form an uncoated ground ceramic cutting insert having at least a portion being ground;

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert; and

wherein the powder mixture comprises alumina and silicon carbide whiskers. the powder mixture comprises about 34.4 weight percent alumina, about 19.1 weight percent silicon carbide whiskers, about 0.3 weight percent yttria, and the balance titanium carbonitride.

22. (Original) The process according to claim 21 wherein the titanium carbonitride has the formula TiC_xN_y , and equals about 0.5 and y equals about 0.5.

23. (Currently amended) The process according to claim 9 A process for making a heat treated ground ceramic cutting insert comprising the steps of:

forming a green ceramic cutting insert compact from a powder mixture;

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 14

sintering the green ceramic cutting insert compact so as to form a sintered unground ceramic cutting insert compact;

grinding at least a portion of the sintered unground ceramic cutting insert compact so as to form an uncoated ground ceramic cutting insert having at least a portion being ground;

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert, and

wherein the powder mixture comprises about 14.2 weight percent zirconia; about 2.3 weight percent $MgAl_2O_4$; about 1.2 weight percent silicon carbide whiskers; about 0.14 silicon dioxide; about 0.02 calcium oxide; and the balance alumina.

24. (Currently amended) ~~The process according to claim 1 further including the step of~~ A process for making a heat treated ground ceramic cutting insert comprising the steps of:

providing an uncoated ground ceramic cutting insert having at least a portion thereof being ground; and

heat treating the uncoated ground ceramic cutting insert so as to form the heat treated ground ceramic cutting insert; and

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 15

grinding at least a portion of the uncoated
heat treated ground cutting insert.

25. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Cancelled)

32. (Cancelled)

33. (Cancelled)

34. (Cancelled)

35. (Cancelled)

36. (Cancelled)

37. (Cancelled)

38. (Cancelled)

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Cancelled)

43. (Cancelled)

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 16

44. (Cancelled)

45. (Cancelled)

46. (Cancelled)

47. (Cancelled)

48. (Cancelled)

49. (Cancelled)

50. (Cancelled)

51. (Cancelled)

52. (Currently amended) ~~The process according to~~
~~claim 1~~ A process for making a heat treated ground ceramic
cutting insert comprising the steps of:

providing an uncoated ground ceramic cutting
insert having at least a portion thereof being ground; and

heat treating the uncoated ground ceramic
cutting insert so as to form the heat treated ground
ceramic cutting insert;

wherein the uncoated ground cutting insert
during the heat treating is in contact with a setting
powder; and the setting powder includes one or more of the
following and/or their reaction products: the oxides of
aluminum, hafnium, zirconium, yttrium, magnesia, calcium,
and the metals of the lanthanide series of the periodic
table; and nitrides and/or carbides of silicon, titanium,

In the application of: Mehrotra et al.
Serial No. 10/033,051
Filed: October 25, 2001
RESPONSE TO NON-FINAL OFFICE ACTION OF JUNE 3, 2003

Page 17

hafnium, aluminum, zirconium, boron, niobium and carbon;
and

wherein during said heat treating said
uncoated ground cutting insert reacting with said setting
powder wherein the composition of surface of the uncoated
ground ceramic cutting insert has been modified.

53. (Cancelled)

54. (Cancelled)